Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

Validation Study of Turbulent Transport Models for DIII-D H-mode Parameters[1] CHRISTOPHER HOLLAND, UC San Diego, T. LUCE, ITER Organization, S. P. SMITH, O. MENEGHINI, K. H. BURRELL, GA, B. A. GRIERSON, PPPL, G. R. MCKEE, UW-Madison — We report the results of a validation study in which turbulent transport predictions are tested against measurements from a series of DIII-D H-mode discharges. Three discharge conditions are considered, in which neutral beam heating and torque levels are separately varied between 3 to 7 MW, and 1.4 to 6 N-m. Both nonlinear gyrokinetic and quasilinear gyrofluid model predictions are tested, using the CGYRO and TGLF codes, respectively. We find that both models predict ion temperature gradient modes are the dominant long-wavelength instability in all cases, and generally able to simultaneously drive the observed levels of particle, energy, and momentum transport, as well as density fluctuation amplitudes. Significant scatter is found in model performance across case and radius, but no systematic trend is observed, and observations are often reproduced within uncertainties. In general, the gyrokinetic predictions exhibit fidelity equal to or better than the gyrofluid model. Both models predict the low power case lies close to the linear critical gradient, while the high power cases are well above it. Clear differences in predicted critical gradients and transport scaling above these gradients is observed. Synthesis of these results using composite validation metrics is presented.

[1]Work supported by US DOE under DE-SC0018287, DE-FC02-04ER54698, DE-SC0017992, DE-AC02-09CH11466, and DE-FG02-08ER54999.

Christopher Holland
University of California, San Diego

Date submitted: 18 Jun 2019 Electronic form version 1.4